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ABSTRACT

Theories influencing the development of trends in career and technical education (CTE) in Europe, the United States, and the Republic of China (Taiwan)were examined. The analysis established that, when determining the goals of CTE and areas of focus of efforts to improve CTE curricula and delivery, European countries focus on theories related to continuous economic development and the social organization of innovation and, consequently, concentrate on CTE's role in human resource development. The United States is emphasizing CTE's role in the movement toward high-productivity work organizations, whereas the Republic of China is concentrating on development and implementation of a series of coherent CTE curricula to avoid overlapping of individual curricula's contents. The following themes for implementation of CTE curricula in Taiwan were identified: (1) establishment of occupational standards; (2) competency certification; (3) collaboration between schools and industry; and (4) lifelong learning theory. The following areas of direction and strategies for CTE were identified in the study countries: (1) occupational profiles, core occupations, and cooperation between education and industries in Europe; (2) tech prep and improvements in postsecondary education in the United States; and (3) implementation of a coherent CTE system, collaboration between schools and industries, and school-industry incubation practices in Taiwan. (Contains 10 references.) (MN)

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A Comparative Study of the Trends in Career and Technical Education Among European Countries, the United States, and the Republic of China

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Abstract

Career and technical education is considered a major contributing force in improving a nation's productivity in response to the situation of growing global economic competition. This paper compares the influencing theories relating to the development of the trends in career and technical education among European countries, the United States, and the Republic of China, and the new directions and strategies in the trends. In addition to struggling for continuous economic development, European countries stress the theory of social organization of innovation, proposing ways for career and technical education from the human resource viewpoint. In order to fulfill the purpose of social innovation, industries should not only collaborate with schools to educate qualified future workers, but also renovate work environment, organization and contents through employees' self-autonomy and self-realization. In the United States, "America's Choice: High Skills or Low Wages!" a report issued by the National Center on Education and the Economy's Commission on the Skills of the American Workforce, signified that American companies must move to a high productivity work organization. This means that America should fundamentally change its approach to work and education in the 21st century. In the Republic of China, after the vocational and technical educational system has been well established, it became urgent to develop and implement a series of coherent career and technical curricula to avoid the overlapping of contents. There are four themes for implementing such curricula: the establishment of occupational standards, the competency certification, the collaboration between schools and industries, and the lifelong learning theory.

Along with these theories for the trends, each area or country has developed its own new directions and strategies for career and technical education. Occupational profiles, core occupations, and cooperation between education and industries are the focuses in European countries while tech prep programs and the improvements of postsecondary technical education's quality have become increasingly important directions in the United States. The government of the Republic of China has tried to implement a coherent career and technical education system and a series of curricula, and encouraged the collaboration between schools and industries, and the school-industry incubation practice. The comparisons of the trends in career and technical education among different area or countries can serve as examples for future adaptation or modification, and improvement of career and technical education, and also build up world class workers for every country at the beginning of the 21st century.

Keywords: career and technical education, comparative education, trends in career and technical education

Backgrounds of the Trends in Career and Technical Education in European Countries, the United States, and the Republic of China

In the past decade, career and technical education in most of the countries in the world has experienced many vigorous reform activities, especially in European countries, the United States, and the Republic of China in Taiwan. The purpose of this paper is to compare the backgrounds of the trends in career and technical education in these countries, and to delineate the new directions and strategies for improving the quality of career and technical education.

European countries started out with "the Post-16 Strategies Project" in 1996-1997 and continued to follow up the effects of this project with the SPES-NET project involving fourteen institutions and thirteen countries from all over Europe. The thirteen countries included England, France, Austria, Germany, Scotland, Norway, Finland, Belgium, Spain, Greece, Hungary, Demark, and Estonia. The results indicated that the idea of social organization of innovation could modernize industrial production and service industry by adopting the "shaping principle" as a guideline for vocational education (Heidegger, 2000). Thus, career and technical education needs to respond to lifelong learning theory, and select core occupations and occupational profiles.

In the United States, career and technical education was seen to be the education for the 21st century (Castalda, Schray, & Lyons, 2000). According to the goals of globalization and high technological economic development, "high skills or low wages" was the key point. Career and technical education must follow the economic trends in order to develop its own directions and strategies for fostering technical manpower. In Taiwan, after three consecutive vocational education improvement projects were completed, the government has established a vocational and technological education system, articulated vocational and technical curricula, and designed lifelong career and technical education programs to cultivate competitive world-class workers with flexible high tech skills.

Although the trends in career and technical education vary from country to country, the final goal of educational development is quite similar. This paper compares the similarities and differences of the trends in career and technical education in terms of theories, and directions and strategies, with an aim to enhance the quality of the education.

Theories Relating to the Trends of Career and Technical Education in European Countries, the United States, and the Republic of China

In this section, all the theories relating to career and technical education in European Countries, the United States, and the Republic of China are first discussed, followed by a comparison of the theories.

Theories Relating to the Trends of Career and Technical Education in European Countries

The main objective of SPES-NET project in Europe was to improve the status of vocational education and training in different European countries through four reform strategies identified by the SPES-NET project (Stenstrom, 2000). The strategies were vocational enhancement, mutual enrichment, linkages, and unification. In fact, appropriate strategies were designed in each European country. Despite different approaches taken by these countries, the European people still maintained their socially oriented cultural traditions (Rauner & Ruth, 1991).

Due to the traditions, human resource development is even more important than technological development in the processes of economic growth. Therefore, the "shaping principle" for the purpose of human resource development, and career and technical education became dominant in Europe. Such approach is in contrast to the "adaptation approach," in which people influenced only the boundary conditions and specific features of the work process, and not the fundamental direction. According to the shaping principle, people can decide their own goals, and have broader visions of directions in regard to work. As a result, two main directions evolved: (a) engaging workers in shaping the working conditions, the work organization and the content of their work, and (b) using competencies, especially creativity, to promote initiatives that contribute to the creation of new jobs. The influence of the principle could be strengthened if people have the competencies to design their future work, private life, technological and economic priorities, and societal conditions. Career and technical education plays an important role in fostering the ability of workers to perform their jobs self-reliantly, independently, and creatively, and use communicative skills effectively. Traditional education and training methods fail to fulfill such tasks, and only the education of multi-skill and lifelong learning could help individuals achieve these goals.

Theories Relating to the Trends of Career and Technical Education in the United States

In the last century, college-bound preparatory education has long been considered the mainstream of high school education while career and technical education a low level and narrow scope of learning. Not until a recent report, "America's Choice: High Skills or Low Wages!" was published, did career and technical education become an important method of cultivating needed high skilled workers for enterprises. According to the report, there was a shift in production orientation and large companies were replacing the "Taylor" methods with high performance teams. The shift required career and technical education to train front-line workers in new flexible capabilities in order to assume multiple tasks.

At the beginning of the 21st century, the American workforce structure shows that 40% of technical workers will require postsecondary educational diploma or certifications, and become the core workforce. Community colleges should supply the needed workers in the competitive global economy. One effective way to strengthen students' work capabilities is to develop tech prep programs to integrate secondary and postsecondary educational programs. The purpose of tech prep programs as described in the Carl D. Perkins Vocational and Technical Act, is to integrate academic and vocational programs, and at the same time to articulate secondary and postsecondary educational curricula (Castalda, Schray & Lyons, 2000). There are three types of curriculum integration: academic and vocational programs, school- and job-oriented learning, and secondary and postsecondary programs. Hopefully, the tech prep programs could form a smooth transition from secondary to post secondary education. Under the concept, new American high schools and middle colleges become the new reform initiatives.

Theories Relating to the Trends of Career and Technical Education in the Republic of China

The system and quality of career and technical education were recently at the top of the reform priority list. Hwang (2000), Director of Vocational and Technological Education Department, established a coherent career and technical education system encompassing three levels of education: vocational high schools, junior colleges of technology, and colleges/universities of technology. In the 2000-2001 academic year, a total of 1,581,183 students enrolled in TVE schools, representing more than half of the total number of students in both upper-secondary and postsecondary schools. Of these, there were188 vocational high schools, 23 junior

colleges of technology, and 67 colleges/universities of technology. Among the TVE students, there were 647,920 students enrolled in colleges/ universities of technology, 444,186 students enrolled in junior colleges, and 427,366 students in vocational high schools, and 61,711 students in comprehensive high schools (Ministry of Education, 2002).

With regard to the quality of career and technical education, the curriculum is required to be job-oriented. Based on task analysis and competencies, teachers could decide on the curricular objectives, contents, learning activities, and teaching and evaluation methods. Collaboration between schools and enterprises, and the project method would greatly enhance the quality of career and technical education. Eventually, students of career and technical education should have employable skills and knowledge, professional certification, and occupational abilities for present and future work needs, and lifelong learning.

In the past fifty years, career and technical education has produced a competent workforce for the needs of economic development. However, the educational objective of solely providing skilled workers soon became inadequate and the other objective of meeting individual career needs prevalent. Hence, comprehensive high schools and articulated vocational curricula could facilitate the process of meeting individual career needs (Wu, 2000).

Implications of the Comparisons of the Related Theories Affecting the Trends of Career and Technical Education

Socially oriented cultural traditions could fundamentally shape the working condition, the work organization, and the content of work, and possibly create new jobs. European countries adopted the "social organization of innovation" and the "shaping principle" so that career and technical education could foster the ability of workers to perform their jobs self-reliantly, independently, and creatively, and use communicative skills effectively. Specifically, the education should train people with the competencies required for designing new work, personal lives, technological and economic priorities, and societal conditions in order to shape the future.

On the other hand, under the concepts of high technology, flexibility, and high productivity, educators of career and technical education in the United States promoted the tech prep programs to integrate academic and vocational programs and articulate secondary and postsecondary curriculum. The main purpose of tech prep programs is to strengthen the American workforce by preparing workers with postsecondary education to work effectively and innovatively. The efforts to educate adequately qualified workers are similar to the European countries.

The development of career and technical education in Taiwan is very similar to that of the United States. The career and technical education system not only encompasses vocational high schools and two-year junior colleges, but also four-year colleges and universities in order to meet students' needs for higher education and lifelong learning. Furthermore, coherent career and technical curricula are designed for better articulation among different levels in the system. Although the basic evolving theories for the trends in career and technical education vary among different countries, some similarities exist, such as the integration of academic and vocational programs, stressing work-based education, and high productivity workers.

New Directions and Strategies for the Trends in Career and Technical Education in Various Countries

Through the discussion and comparisons of the theories relating to the trends in career and technical education in European countries, the United States, and the Republic of China, evolved some new directions and strategies for career and technical education. The newly developed directions and strategies are delineated in this section, followed by the comparisons among them.

New Directions and Strategies for the Trends in Career and Technical Education in European Countries

In view of the context and status of career and technical education, each European country varies in the analysis of their national reforms in terms of the four post-16 strategies. The four strategies are: the national enhancement strategy (enhancement of vocational education programs), the linkage strategy (developing linkages between academic and vocational programs), the mutual enrichment strategy (encouraging mutual enrichment between academic and vocational programs), and the unification strategy (developing a unified educational provision to replace educational systems based on academic/vocational division). By comparing the reforms of career and technical education against these four strategies, the results showed that although the development of the education varied greatly among European countries, but some similarities existed. The basic similarities are the concepts of social organization of innovation and the shaping principle. These could be achieved through the education in which workers are trained to perform their jobs self-reliantly, independently, and creatively, and use communicative skills, and in addition, to shape their working conditions, work organization, and the content of their work. In order to respond to the reform of career and technical education, there are some common directions and

strategies:

- Clearly define structure of occupation based on the specific work tasks. A clearly defined occupational structure of a specific work makes the labor market transparent to both employers and employees and forms a fair pay structure. Thus, career and technical education should cultivate students in a way that prepares them for a certain level of performance in a certain occupation. Furthermore, the occupational profiles must be described in a more open and dynamic way than in the past (Heidegger, 2000).
- Establish a system of alternative training. Modular vocational education is inadequate to prepare students for flexible work tasks. Therefore, a combined system of alternate education between schools and companies is necessary. This involves an integrated vocational curriculum shared by schools and companies as a means of meeting the occupational requirements of companies.
- Initiate core occupations. One of the important issues facing European industries is establishing a balance between the stabilizing function of occupational profiles and the demands for mobility or flexibility in occupations. First, a drastic reduction in the number of occupational profiles is necessary for new combined occupations linking different fields because occupational skills in various fields are required to function well in some jobs. Core occupations with open and dynamic activities necessitate changes in career and technical education programs in order to attain the goal of transferring occupational identities to new fields of activities.

From the above directions and strategies, some reform measures evolved, such as the occupational structure relating to the programs offered by vocational education, the contents of instruction, cooperation between education and work, and the establishment of core occupations. Flexible curriculum contents and the selection of core occupations can enable educational contents to be congruent with the skill requirements of industries, and the graduates of schools to be competent to perform their tasks. Cooperation between education and work mandates an alternative training system that is conducive to a combined learning environment for students to acquire technical skills and knowledge, and at the same time to adjust themselves to the work environments. These three reform measures can facilitate the students' transfer of occupational skills, and are opportunities for realizing the social organization of innovation and the shaping principle. The final goal is to establish individual standardized occupational contents for each field, and to gain public recognition of career and technical education as a profession.

New Directions and Strategies for the Trends in Career and Technical Education in the United States

In 1990, due to the demands of workers with high skills and high productivity, the Carl D. Perkins Vocational and Applied Technology Education Act described the tech prep programs as another form of vocational education. Until 1994, the Scholl-to-Work Opportunity Act (STWOA) provided a framework to address the economic needs through education and business parternership by introducing three types of integration. The triple integrations are integration of academic and vocational education programs, integration of school- and work-based learning, and integration of secondary and postsecondary vocational education programs (Hogg, 1999). In 1998, to further remove the boundary between academic and vocational education, the Carl D. Perkins Act directly defined vocational education as tech prep education. By seamless curriculum articulation, the goal of improving the effectiveness of secondary and postsecondary vocational education could be achieved.

Related directions and strategies include the establishment of career clusters, and the implementation of career academies, new American high schools, and middle colleges. The categories of career clusters are divided into sixteen areas: (1) agriculture& natural resources; (2) architecture & construction; (3) arts, A/V technology & communicatio0n; (4) business& administration; (5) education & training; (6) finance; (7) government & public administration; (8) health science; (9) hospitality & tourism; (10) human services; (11) information technology; (12) law & public safety; (13) manufacturing; (14) retail/wholesales sales & service; (15) scientific research & engineering; and (16) transportation, distribution & logistics (Castalda, Schray & Lyons, 2000). The classification of career clusters could facilitate students in their career awareness, exploration, and preparation, and served as a guideline to help career and technical schools in program-to program articulation.

In addition, the trends in developing new forms of secondary schools including new American high schools, career academies, and magnet schools, are closely correlated to the concept of tech prep. Another form of the program articulation example is "middle colleges."

New Directions and Strategies for the Trends in Career and Technical Education in the Republic of China

In Taiwan, a well-designed career and technical education system was established with three levels of education: vocational high schools, junior colleges,

and colleges/universities of technology. In the system, students not only freely choose schools based on their interests and aptitudes, but could also shift to regular academic education pathway. After the system has operated successfully, a need for planning and implementing coherent career and technical curricula became imperative. By setting up a framework of career clusters, seventeen clusters were identified for the purpose of further developing occupational curriculum for each cluster (Lee, 2001).

To make the curriculum work-based, task analysis and curriculum standards are adopted to determine the instructional contents for the career and technical education programs. Moreover, a flexible school entrance method for students to progress up the educational ladder, and collaboration between schools and companies (cooperative education, cooperation between schools and enterprises, and the establishment of incubation centers) are among the current strategies to cope with the needs of a competitive global economy.

Implications of the Comparisons of the New Directions and Strategies for the Trends in Career and Technical Education Among Different Countries

From the perspective of curriculum planning and integration, current directions and strategies for developing career and technical education in different countries are similar in that occupational standards for designing curriculum contents and teaching methods are developed to meet the needs of lifelong learning and enterprises. The United States and Taiwan adopted the occupational cluster approach while European countries stressed flexible occupational profiles.

In the United States, federal legislations play an important role in promoting tech prep programs, and community colleges provide students with technical skills required by companies. Thus, in the 21st century, the nation could sustain its economy by maintaining a highly skilled and productive workforce.

In most of the European countries, flexible occupational profiles and core occupations provided career and technical education with necessary occupational contents. In-company training could augment school-based instruction by combining work and education.

In summary, using career clusters as a means for curriculum development in career and technical education is a common practice in the U. S. and Taiwan. On the other hand, the flexibility and creativity of American career and technical schools in developing new curriculum exemplified the strength of a decentralized educational system while in Taiwan, career and technical schools need to avoid the weakness of a centralized educational system in curriculum development. Beside career clusters, flexible occupational profiles, and core occupations could serve as other effective

ways of improving the quality of career and technical education from a socially oriented perspective.

Conclusions and Recommendations

The reform movement in career and technical education continues from the past century. The career and technical education development in the United States, European countries, and the Republic of China has especially generated abundant exemplary theories and strategies. The comparisons of the developmental trends in theories and strategies in career and technical education in these countries could result in some similarities and differences that could enhance the reform processes in other countries. From the preceding discussions, some conclusions and recommendations are drawn. The conclusions include:

(1) In view of economic development or sustainability, career and technical education in the U. S. and Taiwan has emphasized a workforce with high skills, flexibility, and productivity to compete in the global economy. In European countries, in addition to the economic development, social organization of innovation from human resource viewpoint influenced the directions and strategies of career and technical education in fostering competent workers. Despite the theoretical differences, the aim of improving the quality of career and technical education is the focus in these countries.

(2) The planning and integration of career and technical education stresses work-based education to augment school-based instruction. Task analysis, the establishment of career clusters, occupational profiles, and the selection of core occupations could assist in career and technical education by constructing a framework for future curriculum development.

(3) The American tech prep programs and collaboration between schools and enterprises, a clearly defined structure of occupations, core occupations, and in-company training in European countries, a coherent career and technical curriculum design, and multiple school entrance channels for easy access to further education in Taiwan are contemporary directions and strategies to meet the need of providing competent workforce.

Recommendations based on the previous discussions and conclusions are:

(1) The contents of the curriculum in career and technical education should include both technical skills and human and social factors to provide students with the competencies to design future work, private life, technological and economic priorities, and societal conditions. Hence, humanity and technology are equally important in the curriculum contents of

career and technical education. Flexible programs, and school-based and work-based instruction with occupational standards are crucial factors affecting the success of the education (Wu, 2001).

(2) Collaboration between schools and enterprises can keep career and technical education on par with industrial progression. Work-based education programs such as cooperative education, in-company training, school-to-work education, and incubation centers are effective ways to improve both the career and technical education and the competency of the workforce.

(3) Tech prep programs should involve integration of academic and vocational education programs, the integration of school-based and work-based learning, and the integration of secondary and postsecondary education programs. The triple integrations can eliminate the boundary between academic and vocational education, and combine practice and theory to better educate students in obtaining necessary skills and knowledge.

(4) Career clusters as a framework for designing occupational programs, the establishment of occupational structure, occupational profiles, and core occupations are potential considerations in the processes of curriculum development. The flexibility and creativity of people are key elements in the education.

(5) Career and technical education should provide education for all the people, including regular career preparatory education, special vocational education, adult education, and lifelong learning education. The comparisons of theories, directions, and strategies in different countries can facilitate the development of new initiatives or approaches to the betterment of career and technical education and the quality of life.

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